

Intro to Arduino

About MakerFX

MakerFX Makerspace is a unique makerspace in South Orlando. This space is organized by a group of like minded makers who saw the need for a new space in Orlando to fill the geographic gaps and walk hand in hand with other local spaces, FamiLAB and Factor. MakerFX is a makerspace program of The Maker Effect Foundation.

The Maker Effect

The Maker Effect Foundation exists to activate and amplify the efforts of makers as they learn, build and work together in their communities. Our efforts include research, publication, community organization, event production, and startup advisement.

Hi, I'm Sean

Demo Features

- Digital Output
- Digital Input
- Serial Communication

What is Arduino?

- Arduino Company
 - Arduino Hardware
 - Arduino Software IDE
 - Arduino Library
- OPEN SOURCE!



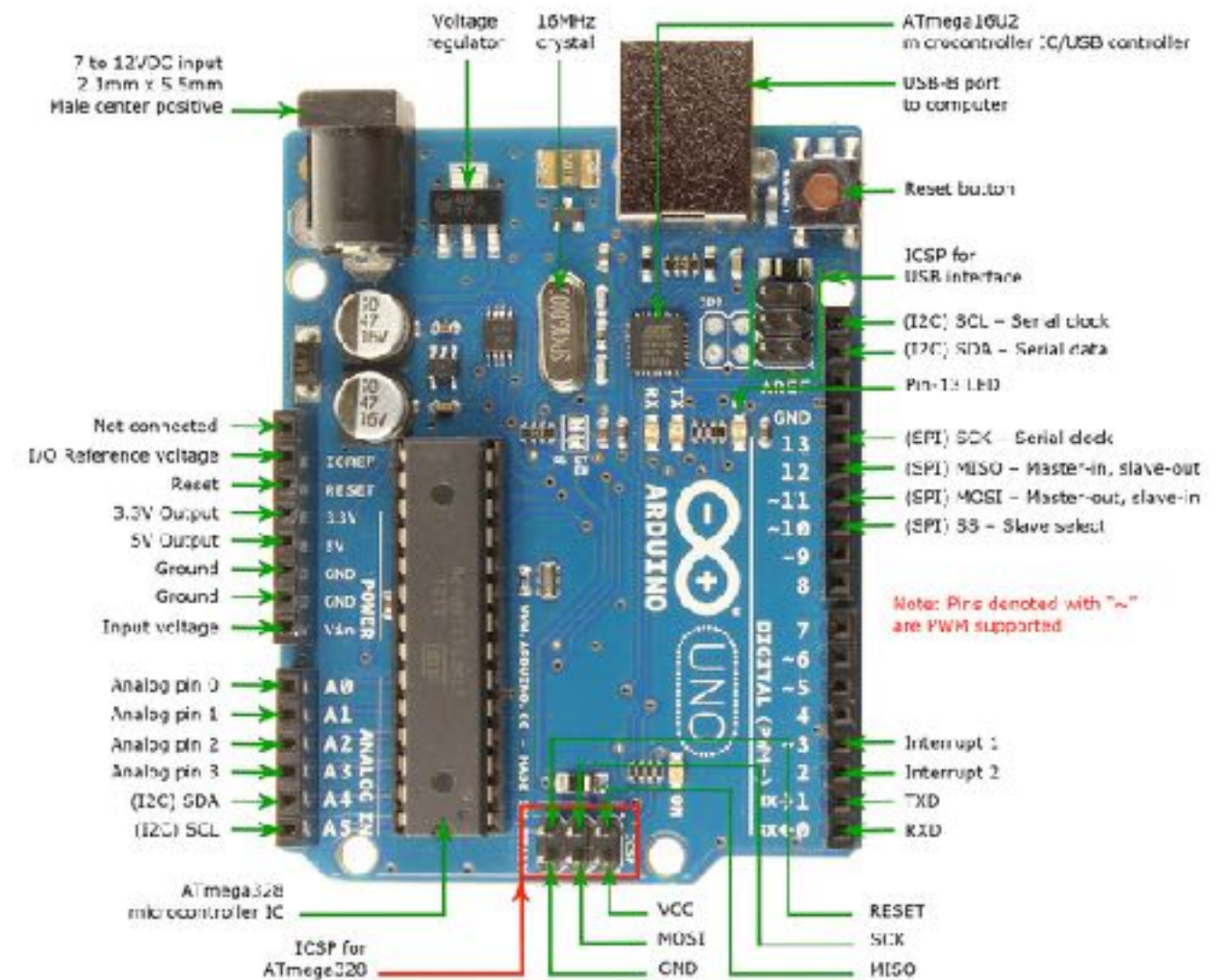
Arduino Uno

- Microcontroller Board
- Based around the ATmega328
- Power Supply
- Programming Interface
- Support Hardware
- I/O Pins Easily Accessible



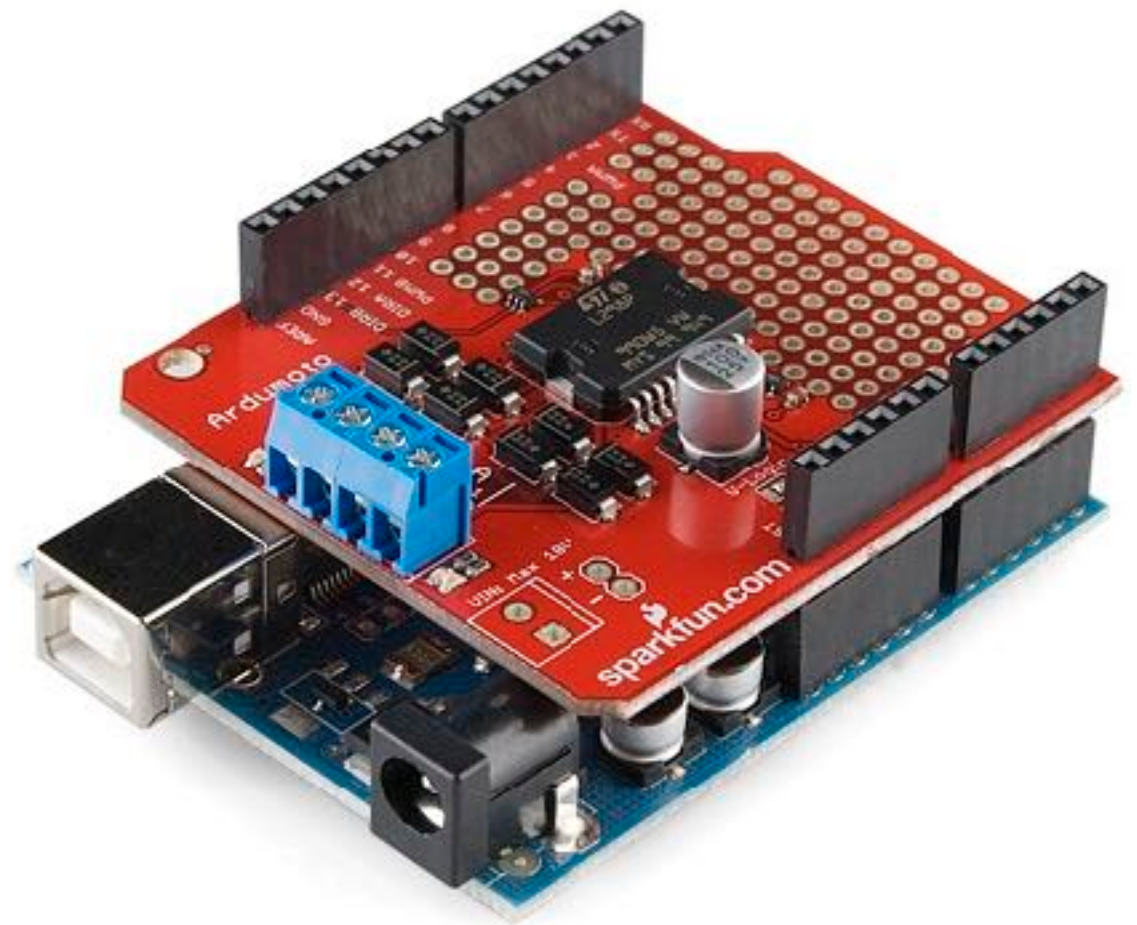
Arduino Uno

- 14 Digital I/O Pins
- 6 Analog Input Pins
- 6 PWM Output Pins
- Operates at 5v
- Runs at 16MHz
- USB Connection for power, serial communication and programming.



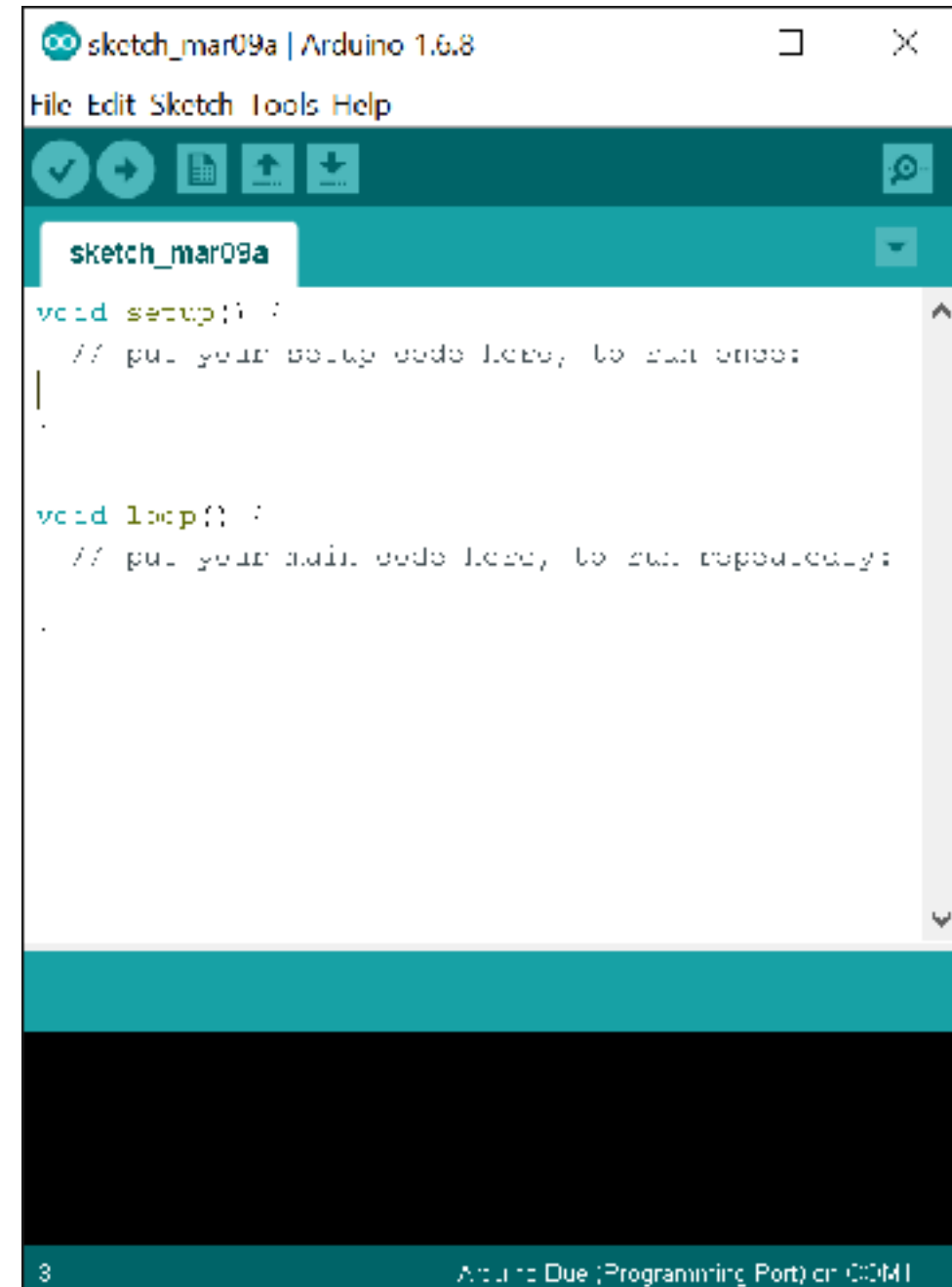
Arduino Shields

- Adds Functionality Simply
- Examples:
 - Motor Shield
 - Ethernet Shield
 - Wifi Shield
 - Bluetooth Shield
 - NFC Shield
 - Relay Shield



Arduino IDE

- Programs are “Sketches”
- Simple Interface to Write Code
- One Click Access:
 - Compile Code
 - Program Board
 - Monitor Serial Console
- Easy to Add Board Support
- Easy to Add Libraries



<http://arduino.cc>



**AND NOW FOR SOMETHING
COMPLETELY DIFFERENT**

C++

Comments

- Comments in Code
 - `//` comments out a single line
 - `/* */` comments out multiple lines
 - Commented lines are ignored

```
// Ignore me
```

```
/*
```

```
    This is not the code  
    you're looking for.
```

```
*/
```

Variables and Functions

- Variables
 - Point to a piece of data in memory
 - Must be declared and given a data type
 - Assign a new value using =

```
int myVar;  
myVar = 5;  
  
int sum = myVar + myVar;  
// sum = 10
```

Variables and Functions

- Functions
 - Point to a block of code
 - May accept input and/or provide output
 - Defined and Invoked

```
int doMath(int num1, int num2){  
    return num1 + num2;  
}  
  
int sum = doMath(5,3);  
// sum = 8
```


Conditionals and Loops

- Conditionals
 - Make a decision whether to run a block of code.

```
if( a == b ){  
    // do something  
}else{  
    // do another thing  
}
```

Conditionals and Loops

- Loop
 - Runs a block of code over and over and over...
 - Iterator , condition , increment

```
for( int i = 0 ; i < 10 ; i++ ){  
    // do something  
}
```

Data Types

- Strings

```
String myVar;  
myVar = "Hello World";
```

- Numbers: Integers and Decimals

```
int myInt = 5;  
float myDecimal = 3.5;
```

- Void

```
void myFunction(){  
}
```

Core Arduino Functions

- Setup

```
void setup(){  
  // do stuff here  
}
```

- Loop

```
void loop(){  
  // do stuff here  
}
```

Hello, Arduino

- Pin Mode

```
pinMode(13, OUTPUT); // or INPUT or INPUT_PULLUP
```

- Digital Write

```
digitalWrite(13, HIGH); // or LOW
```

- Delay

```
delay(1000); // 1000ms = 1 second
```

DIGITAL OUTPUT DEMO

Digital Input

- Pin Mode

```
pinMode(8, INPUT_PULLUP);
```

- Digital Read

```
digitalRead(8); // returns HIGH or LOW (1 or 0)
```

DIGITAL INPUT DEMO

Serial Communication

- Communicates over USB
- Uses Digital Pins 0 and 1
- Master & Slave must agree on speed.
- For us, 115200 is fine



Serial Comms

- Initialize The Connection

```
Serial.begin(115200);
```

- Output to Computer

```
Serial.println("Hello World");  
Serial.println(5);
```

SERIAL DEMO

Synchronous Vs. Asynchronous

- Blocking vs. Non-blocking
- `delay()` is evil*
- Makes a project much seem faster / more responsive
- Use `millis()` to unblock your loop.

NON-BLOCKING BLINK DEMO

Q & A